

WHAT IS CLAIMED IS:

1. A scanning exposure apparatus comprising:
 - an illumination optical system for
 - 5 illuminating a pattern on a mask using arc-shaped illumination light;
 - a projection optical system for projecting the pattern on the mask illuminated by said illumination optical system onto a plate;
- 10 a mask stage for scanning the mask;
- a plate stage for scanning the plate, said scanning exposure apparatus scanning said mask stage and plate stage synchronously relative to said projection optical system;
- 15 a mask support mechanism for supporting a peripheral of the mask; and
- a mask stage tilt mechanism for arranging the pattern in an area illuminated by the arc-shaped illumination light in an object-surface-side focal plane of said projection optical system, wherein the mask deforms due to its own weight from the peripheral supported.
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- 25 2. A scanning exposure apparatus according to claim 1, wherein said mask support mechanism supports the mask at least at two sides parallel to and/or perpendicular to a scan direction.

3. A scanning exposure apparatus according to
claim 1, wherein said mask support mechanism supports
the mask only at two sides parallel to a scan direction.

5. 4. A scanning exposure apparatus according to
claim 1, wherein said mask stage tilt mechanism tilts
the mask relative to the scan direction by tilting a
stage stool mounted with the mask.

10 5. A scanning exposure apparatus according to
claim 1, further comprising a projection magnification
correction mechanism for correcting a projection
magnification in a direction orthogonal to a scan
direction.

15 6. A scanning exposure apparatus according to
claim 1, further comprising a stage control mechanism
for synchronizing said mask stage and plate stage at a
speed ratio corresponding to a projection magnification
20 of said projection optical system, and for scanning
relative to said projection optical system, wherein
said stage control mechanism adjusts the speed ratio
according to tilts of the mask and plate.

25 7. A scanning exposure apparatus comprising:

an illumination optical system for illuminating a pattern on a mask using arc-shaped illumination light;

a projection optical system for projecting
5 the pattern on the mask illuminated by said illumination optical system onto a plate;

a mask stage for scanning the mask;

a plate stage for scanning the plate, said scanning exposure apparatus scanning said mask stage
10 and plate stage synchronously relative to said projection optical system;

a mask support mechanism for supporting a peripheral of the mask; and

a plate stage tilt mechanism for arranging a
15 surface of the plate in an object-surface-side focal plane of said projection optical system which plane images the pattern in an area illuminated by the arc-shaped illumination light, wherein the mask deforms due to its own weight from the peripheral supported.

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8. A scanning exposure apparatus according to claim 7, wherein said mask support mechanism supports the mask at least at two sides parallel to and/or perpendicular to a scan direction.

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9. A scanning exposure apparatus according to
claim 7, wherein said mask support mechanism supports
the mask only at two sides parallel to a scan direction.

5 10. A scanning exposure apparatus according to
claim 7, wherein said mask stage tilt mechanism tilts
the mask relative to the scan direction by tilting a
stage stool mounted with the mask.

10 11. A scanning exposure apparatus according to
claim 7, further comprising a projection magnification
correction mechanism for correcting a projection
magnification in a direction orthogonal to a scan
direction.

15 12. A scanning exposure apparatus according to
claim 7, further comprising a stage control mechanism
for synchronizing said mask stage and plate stage at a
speed ratio corresponding to a projection magnification
20 of said projection optical system, and for scanning
relative to said projection optical system, wherein
said stage control mechanism adjusts the speed ratio
according to tilts of the mask and plate.

25 13. A scanning exposure apparatus comprising:

an illumination optical system for illuminating a pattern on a mask using arc-shaped illumination light;

a projection optical system for projecting

5 the pattern on the mask illuminated by said illumination optical system onto a plate;

a mask stage for scanning the mask;

a plate stage for scanning the plate, said scanning exposure apparatus scanning said mask stage

10 and plate stage synchronously relative to said projection optical system;

a mask support mechanism for supporting a peripheral of the mask; and

a mechanism for tilting the mask stage and

15 the plate stage for arranging a surface of the plate in an object-surface-side focal plane of said projection optical system which plane images the pattern in an area illuminated by the arc-shaped illumination light, wherein the mask deforms due to its own weight from the

20 peripheral supported.

14. A scanning exposure apparatus according to claim 13, wherein said mask support mechanism supports the mask at least at two sides parallel to and/or

25 perpendicular to a scan direction.

15. A scanning exposure apparatus according to
claim 13, wherein said mask support mechanism supports
the mask only at two sides parallel to a scan direction.

5 16. A scanning exposure apparatus according to
claim 13, wherein said mask stage tilt mechanism tilts
the mask relative to the scan direction by tilting a
stage stool mounted with the mask.

10 17. A scanning exposure apparatus according to
claim 13, further comprising a projection magnification
correction mechanism for correcting a projection
magnification in a direction orthogonal to a scan
direction.

15 18. A scanning exposure apparatus according to
claim 13, further comprising a stage control mechanism
for synchronizing said mask stage and plate stage at a
speed ratio corresponding to a projection magnification
20 of said projection optical system, and for scanning
relative to said projection optical system, wherein
said stage control mechanism adjusts the speed ratio
according to tilts of the mask and plate.

25 19. A scanning exposure method for illuminating a
pattern on a mask using arc-shaped illumination light,
and for projecting the pattern on the mask illuminated

by said illumination optical system onto a plate, said scanning exposure apparatus scanning the mask and plate synchronously relative to a projection optical system, said method comprising the steps of:

- 5 exposing a focus-measurement pattern mask;
- measuring a focus position of a specific area from light intensity or resolution performance of a focus measurement pattern image on the plate;
- interpolating a measurement result linearly
- 10 and identifying an image plane position;
- calculating a tilt angle for tilting the mask and/or plate to arrange a surface of the plate on a focal plane at an image-surface position;
- correcting a tilt of a mask stage and/or
- 15 plate stage based on calculated data; and
- exposing an actual mask.

20. A scanning exposure method according to claim 19, further comprising, in measuring a focus state of
- 20 the specific area from the focus measurement pattern, the steps of:

- scanning only the focus-measurement pattern mask in a scan direction; and
- identifying the image-surface position based
- 25 on an output from a light quantity detector arranged in a specific exposure area.

21. A scanning exposure method according to claim
19, further comprising, in measuring the focus state of
the specific area from the focus measurement pattern,
the steps of:

5 exposing the focus-measurement pattern mask
and a plate that applies a photosensitive material, in
a scan direction;

verifying a focus state from a sensitized
image on the plate; and

10 identifying the image-plane position based on
verified data.

22. A device fabrication method comprising the
steps of:

15 exposing a device pattern onto a plate using
a scanning exposure method; and

developing the plate that has been exposed,
wherein said scanning exposure method

illuminates a pattern on a mask using arc-shaped
20 illumination light, and projects the pattern on the
mask illuminated by said illumination optical system
onto a plate, said scanning exposure apparatus scanning
the mask and plate synchronously relative to a
projection optical system, said method comprising the
25 steps of:

exposing a focus-measurement pattern mask;

- measuring a focus position of a specific area from light intensity or resolution performance of a focus measurement pattern image on the plate;
- interpolating a measurement result linearly
- 5 and identifying an image plane position;
- calculating a tilt angle for tilting the mask and/or plate to arrange a surface of the plate on a focal plane at an image-surface position;
- correcting a tilt of a mask stage and/or
- 10 plate stage based on calculated data; and
- exposing an actual mask.